

What is Claimed Is:

1. A composition for producing cartilage, comprising human mesenchymal stem cells in an alginate gel layer which supports the differentiation and maturation of human mesenchymal stem cells into chondrocytes.
2. The composition of claim 1 further comprising hyaluronic acid.
3. The composition of claim 1 wherein the mesenchymal stem cells are contacted with a chondroinductive agent.
4. A process for inducing chondrogenesis in mesenchymal stem cells by contacting mesenchymal stem cells with an alginate gel *in vitro*.
- 15 5. The process of claim 4 wherein the mesenchymal stem cells are isolated, culture expanded human mesenchymal stem cells.
6. A composition for regenerating cartilage comprising an alginate gel layer which supports the differentiation and maturation of human mesenchymal stem cells into chondrocytes.
- 20 7. A method for regenerating or repairing cartilage comprising contacting an alginate gel with human mesenchymal stem cells and implanting the construct into a site in need of cartilage repair or regeneration.
- 25 8. The method of claim 7 wherein the human mesenchymal stem cells are contacted with a chondroinductive agent.
9. A method for regenerating or repairing cartilage in an individual in need thereof by administering to said individual human mesenchymal stem cells with an alginate gel which supports the differentiation and maturation of such mesenchymal stem cells into a chondrogenic lineage to an extent sufficient to accelerate cartilage formation therefrom.

10. A method for regenerating or repairing cartilage in an individual in need thereof by administering to said individual human mesenchymal stem cells in an alginate solution wherein the alginate solution is caused to solidify *in vivo* and supports the differentiation and maturation of 5 such mesenchymal stem cells into a chondrogenic lineage to an extent sufficient to accelerate cartilage formation therefrom.

11. The method of claim 10 wherein the mesenchymal stem cells in the alginate solution are administered directly to a cartilage defect.

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